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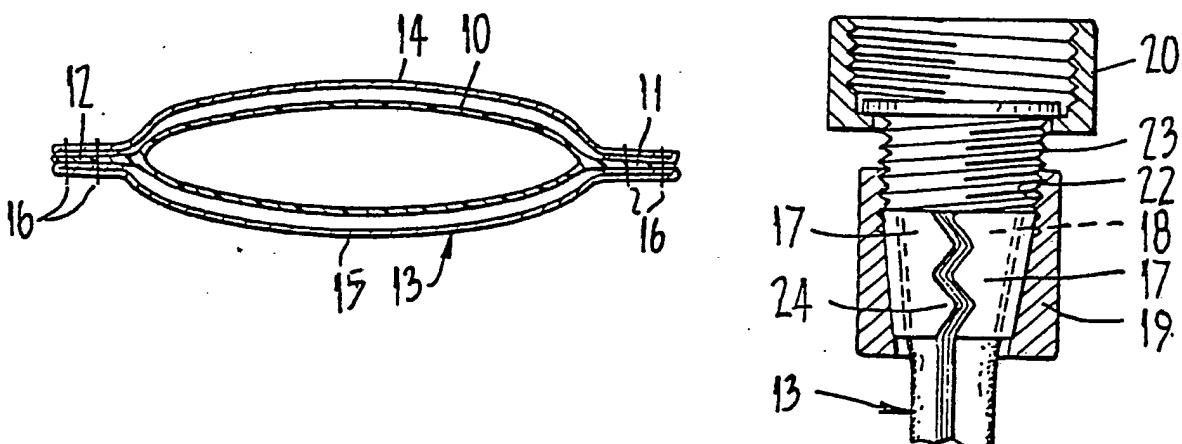
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(81) Designated States: AT (European patent), AU, BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.			

(54) Title: REINFORCED HOSE AND CONNECTOR



(57) Abstract

A hose, in particular a garden hose of the flat type which may be rolled into a planar roll with successive turns concentrically arranged one on top of the other. The hose has an inner tube (10) of extruded plastics material with two opposed outwardly extending longitudinal flanges (11, 12) and an outer tube (13) of woven fabric formed in one or two pieces (14, 15), attached to the inner tube (10) by stitched seams (16) extending along the flanges. A connector comprising a frusto-conical insert member (18), a split collar (17) with mating surfaces (24) to clamp the flanges (11, 12) therebetween and a clamping nut (19) locking over the collar (17) and screwing onto the upper threaded portion (23) of the insert. A method of manufacturing the hose by sewing and a hose with a single flange are included.

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REINFORCED HOSE AND CONNECTOR

This invention relates to hoses for conveying fluid, such as garden hoses, and particularly to hoses of the flat type which may be readily rolled up into a planar roll wherein successive turns of the hose are concentrically arranged one on top of the other.

Hoses of the flat type are more flexible and are more compact when rolled up than the alternative round section hoses which are usually of a unitary structure having the necessary in-built strength to withstand the internal pressures for which the hose is designed. The flat type hoses are usually of a composite structure having an internal fluid conveying tube and an outer protective tube which encases the inner tube to prevent undue expansion and bursting of the inner tube. Usually the inner tube is a seamless extruded plastics tube and the outer tube is a woven fabric which must be light, strong and impervious to rot, for example, polyester, polypropylene and terylene.

However, known hoses of the flat type suffer a number of defects or deficiencies which render them only marginally acceptable in use. For example, the inner tube frequently becomes twisted along the length of the hose relative to the outer tube, with a resultant restriction to the fluid flow which may ultimately cause bursting of the inner tube due to the increase in pressure at the point of restriction. Furthermore, the connection of known flat hoses to a connector for attachment to a tap has not successfully avoided the problems of leaking or bursting which occur all too frequently where a connector is affixed to the hose. A still further problem occurs because the coefficient of expansion differs between the inner and outer tubes causing frictional rubbing between the two mating surfaces and it often occurs that the outer tube forms a concertina over the inner tube with the result that further rubbing occurs between the two mating surfaces. The net result of all this is that wear occurs on the inner tube ultimately causing a premature bursting of the hose. Also, due to the unequal lengths created between inner and outer tubes during assembly there develops an accumulation of one or the other at one end of the hose which causes excessive pressure resulting in damage to the hose.

Furthermore, it has previously been considered desirable for reasons of strength and durability to make the outer tube seamless and this complicates the manufacturing process thus rendering manufacture more expensive. Also, 5 because of difficulties in inserting an inner tube inside a pre-formed seamless outer tube there is a limitation or restriction on the length of known hose that can be manufactured in a single length.

It is an object of this invention to provide an 10 improved fluid conducting hose of the flat type which avoids or at least reduces one or more of the disadvantages of known flat hoses.

It is a further object to provide an improved 15 connector arrangement for connection to the end of a fluid conducting hose of the flat type.

It is a still further object to provide an improved method of manufacturing a fluid conducting hose of the flat type.

Accordingly, one form of the invention provides 20 a fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube for containing the inner tube against bursting under pressure, characterized in that, said inner tube is attached to said outer tube along the length of the hose.

According to a further form of the invention 25 there is provided a connector arrangement for attachment to the end of a fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube, said inner tube having at least one flange extending along 30 the length thereof and attached to said outer tube along a seam, characterized in that, said connector arrangement includes a frusto conical collar split longitudinally to form two similar collar members, said collar members having mating surfaces adapted to clamp a said flange therebetween, 35 a frusto conical insert member for sliding into said inner tube, small end first, and having a threaded cylindrical portion extending from the larger end for threadable engagement with a clamping nut, said clamping nut being adapted to fit over said hose and having a tapered bore portion for

forcing said mating surfaces towards each other as said nut is tightened, so as to cause said collar members to clamp a said flange between the mating surfaces so as to retain the connector arrangement on the hose and form a fluid seal 5 between said insert member and said inner tube.

According to a still further form of the invention there is provided a method of manufacturing a fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube, characterized 10 in that, said method includes the steps of feeding an inner tube, of the kind having opposed outwardly extending flanges extending therealong, into a sewing machine together with opposed elongate strips of material suitable for providing said outer tube and simultaneously stitching adjacent 15 edges of said material together using said machine such that the stitching passes through respective said flanges and thereby attaches said outer tube to said inner tube at said respective flanges along the length of said hose.

In order that the invention may be more readily 20 understood reference should now be made to the accompanying drawings wherein:

- FIG. 1 is a perspective view of a short length of an inner tube according to one embodiment of a hose for conducting fluid,
25 FIG. 2 is an end view of the length of hose shown in FIG. 1,
FIG. 3 is a perspective view of a short length of the inner tube of a fluid conducting hose according to a second embodiment of the invention,
30 FIG. 4 is an end view of the tube shown in FIG. 3 shown in position inside an outer tube,
FIG. 5 is an exploded perspective view, partly 35 in section, of a connector for attachment to one end of a hose according to the invention, and
FIG. 6 is a sectional side elevation of the connector of FIG. 5.

In FIG. 1 the inner tube 10 is formed as an extruded plastics tube of circular cross-section having a flange 11 extending along the length thereof. The flange 11 is consequently formed integral with the tube 10. The 5 dimensions are such that for an inner tube 10 having a diameter of 12 mm the flange 11 has a width, that is, a radial dimension r (FIG. 2) of approximately 3 mm.

Referring now to FIG. 3, there is shown another embodiment of the inner tube 10 wherein as well as a flange 10 11 similar to that in FIG. 1, there is an opposed flange 12 on the opposite side of the inner tube 10. Both flanges 11 and 12 extend along the length of the inner tube 10 and are extruded integral therewith during manufacture of the inner tube 10. Again the radial dimension r of the flanges 11 15 and 12 is about 3 mm for a 12 mm inner tube diameter.

FIG. 4 shows the inner tube 10 in a partially flattened condition inside an outer tube 13 formed of two separate pieces of woven fabric 14 and 15 which are stitched together along adjacent longitudinal edges to form the outer tube. The longitudinal edges of each piece of woven fabric 20 are turned back to provide additional strength along the seams. Stitching 16 which joins the two edges of the fabrics 14 and 15 together also passes through the flanges 11 and 12 of the inner tube. Thus, in utilizing the inner tube shown in 25 the embodiment of FIGS. 3 and 4, it is attached to the outer tube along the length thereof at two positions diametrically opposed.

It should be evident that in using the inner tube shown in the embodiment of FIGS. 1 and 2, the inner 30 tube is attached to the outer tube along the length thereof at one position only according to the position of the flange 11 rather than on opposite sides as occurs with the inner tube of FIGS. 3 and 4. In utilizing the inner tube shown in FIGS. 1 and 2, the outer tube may be formed of two 35 separate pieces of fabric as shown in FIG. 4 or may be a single piece of fabric which is folded around and joined by a single seam.

In manufacturing the hose according to the above described embodiments, it is preferably to use an outer tube

formed of two separate pieces of fabric since a sewing machine which is used to join the inner and outer tubes can more readily be adapted to receive two separate pieces of fabric constituting the outer tube rather than a single 5 piece which is folded over.

In order to manufacture the hose depicted in FIG. 4, a previously extruded inner tube 10 in flat configuration is fed into a sewing machine (not shown) together with the pieces of woven fabric 14 and 15 on either side 10 thereof. Guide rollers (not shown) ensure that the fabric 14 and 15 is folded back at the seams and is in the appropriate position prior to stitching such that when the components pass under the sewing head (not shown), the stitching 16 passes through the woven fabric and the flanges 11 and 15 12. Thus a continuous length of inner tube 10 and woven fabric 14 and 15 may be fed into the machine to produce the final product.

According to the embodiments described above, the outer tube 13 is formed from woven fabric in the form of 20 polyester, polypropylene, terylene or other like fabrics which are generally light in weight, strong and impervious to rot.

Referring now to FIGS. 5 and 6, there is shown a connector arrangement suitable for attachment to an end 25 of a hose according to the above described embodiments whereby the hose with connector may be attached to a tap in such cases where the hose is to be used as a garden hose for example. The connector arrangement is shown to comprise a pair of tapered collars 17 adapted to combine to form a first 30 frusto conical member for location over an end of the hose. The opposed faces of the collars 17 have complementary saw-tooth configurations so that they grip the flanges 11 and 12 therebetween when the collars are in position as shown in FIG. 6. A second frusto conical member 18 having an 35 O-ring 25 thereon is adapted for insertion into the end of the hose. The second frusto conical member 18 has a threaded cylindrical end portion 23 with a flange thereon for engaging the inside of a female member 20 which is adapted for threadable attachment to the outlet of a suitable tap.

The female member 20 is able to rotate independently of the frusto conical member 18.

5 A clamping nut 19 has an internally threaded portion 22 and the remainder of the bore is tapered for engagement with the outer surfaces of the collars 17 to apply a clamping force to the collars when the nut 19 is tightened onto the threaded portion 23 of the second frusto conical member 18. The O-ring 25 forms a seal on the internal surface of the inner tube 10 of the hose.

10 In order to install the connector arrangement on the end of a hose, the nut 19 is firstly slid over the hose, the second frusto conical member 18 is inserted in the end of the hose within the inner tube 10 such that the hose extends up to the threaded portion 23 of the member 18. The 15 two collars 17 are then placed over the end of the hose so that they abut the threaded portion 23 and the saw-tooth configurations are against the flanges 11 and 12. The nut 19 is then tightened onto the threaded portion 23 by engagement with the threaded portion 22 of the nut and this causes 20 the collars 17 to be forced together to rigidly grip the flanges 11 and 12 as is shown clearly in FIG. 6. Of course the female member 20 is engaged over the threaded portion 23 of the frusto conical member 18 prior to assembly on the hose. Thus, once the end of a hose is attached to the 25 connector arrangement, the connector arrangement may be readily attached to a tap in a manner whereby the hose is able to rotate relative to the tap. Clearly, the female member 20 may take any one of a number of different forms depending on the type of connection which is to be made to 30 the tap. The collars 17 rigidly grip the flanges of the hose and prevent it from becoming detached from the connector arrangement. The O-ring 25 ensures a fluid tight seal between the connector arrangement and the hose.

35 It should be evident that the invention provides considerable advantages over known hoses of the flat type and overcomes most if not all of the aforementioned disadvantages essentially because the inner and outer tubes are attached to each other along their length. In addition the method of manufacturing the present invention is much faster

than existing methods because the inner tube does not have to be separately inserted into the outer tube but rather is inserted as the two components are fed into a sewing machine for seaming the outer tube and fixing the two together. Thus the hose can be formed in unrestricted lengths.

Claims

1. A fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube, for containing the inner tube against bursting under pressure, characterized in that, said inner tube is attached to said outer tube along the length of the hose.
2. A hose as defined in claim 1, characterized in that, a flange extends along the length of said inner tube and said outer tube is attached to said flange along the length of said hose.
3. A hose as defined in claim 2, characterized in that, said outer tube is attached to said flange by means of stitching which passes through said outer tube and said flange.
4. A hose as defined in claim 3, characterized in that, a second flange extends along the length of said inner tube, opposite said first mentioned flange, and said second flange is also attached to said outer tube along the length of said hose by means of stitching which passes through said outer tube and said second flange.
5. A hose as defined in claim 4, characterized in that, said outer tube is formed of woven material in two pieces having seams extending along the length thereof and said stitching which passes through said outer tube and respective flanges serves to join said respective seams.
6. A hose as defined in claim 5, characterized in that said woven material is folded back on itself at said seams to provide additional strength and said inner tube is an extruded plastics tube.
7. A connector arrangement for attachment to the end of a fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube, said inner tube having at least one flange extending along the length thereof and attached to said outer tube along a

seam, characterized in that, said connector arrangement includes a frusto conical collar split longitudinally to form two similar collar members, said collar members having mating surfaces adapted to clamp a said flange therebetween, a frusto conical insert member for sliding into said inner tube, small end first, and having a threaded cylindrical portion extending from the larger end for threadable engagement with a clamping nut, said clamping nut being adapted to fit over said hose and having a tapered bore portion for forcing said mating surfaces towards each other as said nut is tightened, so as to cause said collar members to clamp a said flange between the mating surfaces so as to retain the connector arrangement on the hose and form a fluid seal between said insert member and said inner tube.

8. A connector as defined in claim 7, characterized in that, said mating surfaces have complementary saw-tooth edges and said hose has two opposed flanges, each pair of said mating surface being adapted to grip a respective one of said flanges therebetween to retain said connector on the end of said hose.

9. A connector as defined in claim 8, characterized in that, said insert member is rotatably affixed to a female member for engagement with a tap.

10. A method of manufacturing a fluid conducting hose of the flat type having an inner fluid conducting tube and an outer protective tube, characterized in that, said method includes the steps of feeding an inner tube, of the kind having opposed outwardly extending flanges extending therealong, into a sewing machine together with opposed elongate strips of material suitable for providing said outer tube and simultaneously stitching adjacent edges of said material together using said machine such that the stitching passes through respective said flanges and thereby attaches said outer tube to said inner tube at said respective flanges along the length of said hose.

11. A method as defined in claim 10, characterized in that, the longitudinal edges of each of said strips are folded over to provide a double thickness of said material at said stitching.

12. A method as defined in claim 11, characterized in that, said inner tube is an extruded plastics tube and said outer tube is formed of polyester, polypropylene, terylene or like material.

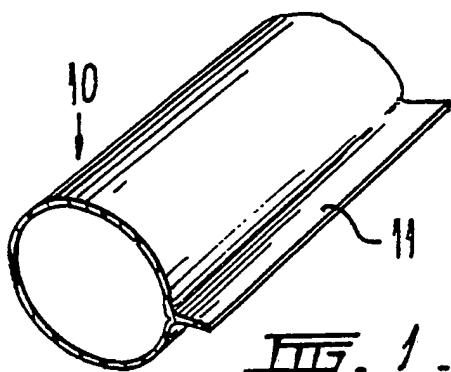


FIG. 1.

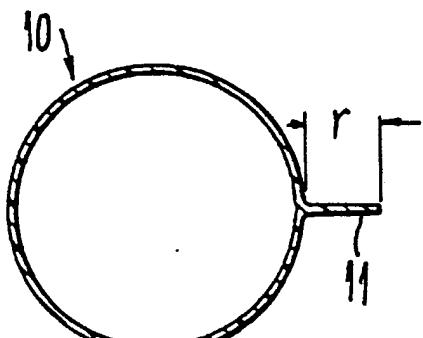


FIG. 2.

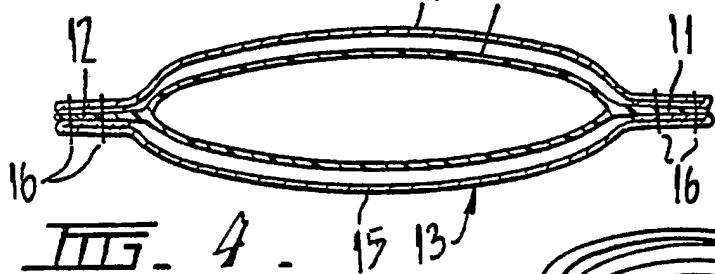


FIG. 4.

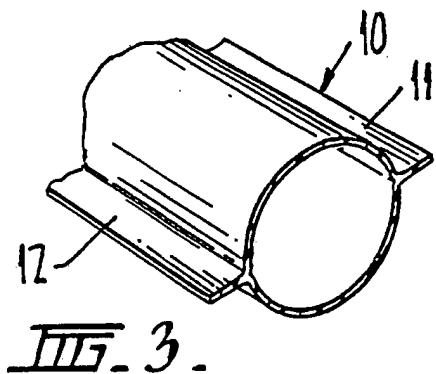


FIG. 3.

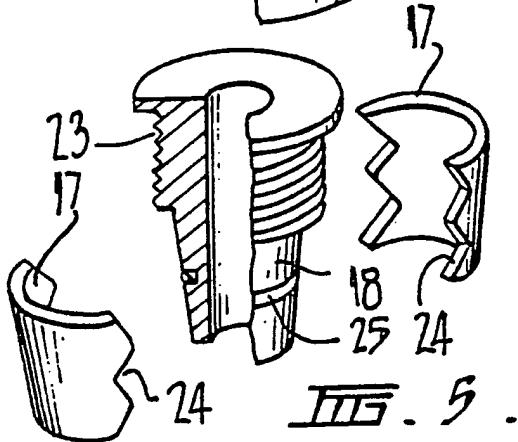
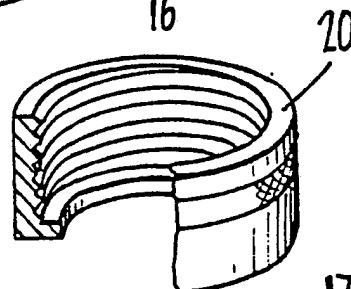


FIG. 5.

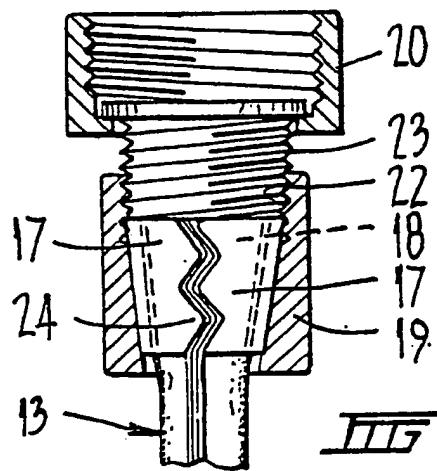
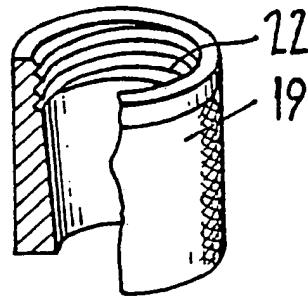


FIG. 6.



INTERNATIONAL SEARCH REPORT

International Application No PCT/AU 85/00024

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁴

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl. ⁴ F16L 11/12, 11/10, 33/01, 33/23

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
IPC	F16L 11/12, 11/10

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁴

AU: IPC as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ⁵	Citation of Document, ¹⁴ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
X,P	US, A, 4478661 (LEWIS) 23 October 1984 (23.10.84)	(1-6,10-12)
X,P	US, A, 4467837 (BAKER) 28 August 1984 (28.08.84)	(1)
Y	US, A, 3749133 (BOCHORY) 31 July 1973 (31.07.73)	(1-6)
X	AU, B, 21032/77 (505163)(GILEAD) 13 July 1978 (13.07.78)	(1,2)
Y	AU, B, 25539/77 (503076)(MITSUI LTD) 30 November 1978 (30.11.78)	(1-6)

- Special categories of cited documents: ¹⁶
- “A” document defining the general state of the art which is not considered to be of particular relevance
- “E” earlier document but published on or after the international filing date
- “L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- “O” document referring to an oral disclosure, use, exhibition or other means
- “P” document published prior to the international filing date but later than the priority date claimed

- “T” later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- “X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step
- “Y” document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- “Z” document member of the same patent family

IV. CERTIFICATE

Date of the Actual Completion of the International Search ⁹

15 April 1985 (15.04.85)

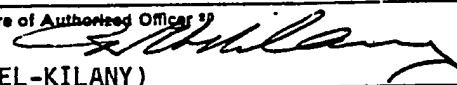
Date of Mailing of this International Search Report ⁹

(01-05-85) 01 MAY 1985

International Searching Authority ¹

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Signature of Authorized Officer ¹⁰


(R. EL-KILANY)

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE¹

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claim numbers....., because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING²

This International Searching Authority found multiple inventions in this International application as follows:

Claims 1-6, 10-12 define a hose and method of manufacturing it.

Claims 7-9 define a connector.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

1-6, 10-12

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

- The additional search fees were accompanied by applicant's protest.
- No protest accompanied the payment of additional search fees.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 85/00024

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members				
AU 21032/77	BR 7700065	DE 2657695	FR 2337848		
	GB 1537201	IL 48801	JP 52088138		
	MX 144714	US 4175882			
AU 25539/77	BR 7703533	CA 1056610	DE 2724559		
	FR 2353223	GB 1536093	IL 52184		
	NL 7706005	US 4139159	JP 52152185		

END OF ANNEX